Електронне наукове фахове видання **"Ефективна економіка"** включено до переліку наукових фахових видань України з питань економіки (Категорія «Б», Наказ Міністерства освіти і науки України від 11.07.2019 № 975)
www. economy.nayka.com.ua | № 7, 2020 | 30.07.2020 р.

DOI: 10.32702/2307-2105-2020.7.62

УДК: 658.1.14/.17+330.341.1

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ENSURING RISK TOLERANCE OF BUSINESS ENTITIES IN CONDITIONS OF INNOVATIVE DEVELOPMENT[1]

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ЗАБЕЗПЕЧЕННЯ РИЗИКОСТІЙКОСТІ СУБ'ЄКТІВ ГОСПОДАРЮВАННЯ В УМОВАХ ІННОВАЦІЙНОГО РОЗВИТКУ

The article substantiates the necessity to take into account the risks in the process of managing the innovative development at the enterprise and identifies the place of the risk tolerance of the enterprise in such administration. The compounds that form the characteristics of risk tolerance of the enterprise were considered. As a result of the work the approaches of modern authors to the definition and disclosure of the concept of "risk tolerance" of the enterprise were studied, the factors included in the assessment of risk tolerance indexes were analyzed. The system of risk tolerance consideration when introducing innovative processes at the enterprises was offered.
The necessity to take into account the risks in the process of managing the innovative development at the enterprise and the place of the risk tolerance of the enterprise in such administration was substantiated in the article. With the use of modern information technologies, the level of scientific interest in risk management issues was analyzed, and it was determined that among such interests, issues related to financial risks prevail. A review of scientific approaches to determining the

[1] This work was supported by the Ministry of Education and Science of Ukraine (Project No. 0117U003922 «Innovative drivers of national economic security: structural modeling and forecasting»).

definition of financial risk was carried out. The compounds that form the characteristics of risk tolerance of the enterprise were considered. As a result of the work the approaches of modern authors to the definition and disclosure of the concept of "risk tolerance" of the enterprise were studied, the factors included in the assessment of risk tolerance indexes were analyzed. It was distinguished that the risk tolerance of the business entity characterizes its interaction with higher-level systems, internal and external factors, its ability to maintain stability in the presence and implementation of risks. It was substantiated that one of the areas of risk tolerance at the enterprise is the detection of risks and the use of various tools to reduce it, among which diversification and insurance are the most commonly used. In order to increase the risk tolerance of the enterprise in the implementation of innovations, risk management tools were proposed based on the use of capital asset pricing model (CAPM), which determines the ratio of profitability and risk inherent in various financial investment tools. It was determined that the key factor in this model that affects the risk is the beta coefficient inherent in a particular enterprise and characterizes the level of its financial risk relative to the market average. To analyze the level of risk, the profitability of energy sector enterprises PJSC "Centerenergo" and PJSC "Donbasenergo" was analyzed, along with the profitability of the PFTS stock index for the last 2 years with monthly profitability. It was concluded that the risks of investing in these enterprises are lower than the market average, which positively characterizes their risk tolerance.

У статті обґрунтовано необхідність врахування ризиків в процесі управління інноваційним розвитком підприємства та визначено місце оцінки ризикостійкості підприємства в такому управлінні. За допомогою сучасних інформаційних технологій було проаналізовано рівень наукового інтересу до питань управління ризиками, та визначено, що серед таких інтересів переважають питання, що стосуються фінансових ризиків. Здійснено огляд наукових підходів до визначення дефініції фінансового ризику. Розглянуто складові, що формують характеристику ризикостійкості підприємства. В результаті роботи було досліджено підходи сучасних авторів до визначення та розкриття поняття "ризикостійкості" підприємства, проаналізовано фактори, що включаються в оцінку показників ризикостійкості. Визначено, що ризикостійкість суб'єкта господарювання характеризує його взаємодію із системами вищого рівня, факторами внутрішнього і зовнішнього середовища, його здатність зберігати стійкість за наявності та реалізації ризиків. Обґрунтовано, що одним з напрямів забезпечення ризикостійкості підприємства є діагностика ризиків та застосування різних інструментів його зменшення, серед яких найбільш часто використовуються диверсифікація та страхування. З метою збільшення ризикостійкості підприємства при здійсненні інновацій запропоновано інструментарій ризик-менеджменту на основі використання моделі управління капітальними активами (САРМ), яка передбачає визначення співвідношення дохідності та ризику, що притаманні різним фінансовим інвестиційним інструментам. Визначено, що ключовим фактором в цій моделі, який впливає на ризикостійкість є бета-коефіцієнт що притаманний конкретному підприємству та характеризує рівень його фінансового ризику по відношенню до середньоринкового. Для аналізу рівня ризику була проаналізована дохідність підприємств енергетичного сектору ПАТ «Центренерго» та ПАТ «Донбасенерго», а також дохідність фондового індексу ПФТС за останні 2 роки зі щомісячною дохідністю. Зроблено висновок, що ризики інвестування в дані підприємства є меншими за середньоринкові, що позитивно характеризує їх ризикостійкість.

Key words: *risk tolerance; financial risk; innovation activity; diversification; capital asset pricing model; β-coefficient; enterprise.*

Ключові слова*: ризикостійкість; фінансовий ризик; інноваційна діяльність; диверсифікація; модель оцінки капітальних активів; β-коефіцієнт; підприємство.*

Problem statement. Financial risks are one of the components of mechanisms of existence of the enterprise, organization and other subjects of economic activity in market economy. Many economists classify them as speculative risks, which can lead to both losses and profits, so building a risk management system is an indispensable necessity for the effective operation of any enterprise. The variety of forms and methods of risk manifestation, as well as the variety of methods for their assessment explains the presence of approaches to risk management. In this aspect, the issues of ensuring the risk tolerance of enterprises come to the fore, which is especially relevant in conditions of their innovative development.

Analysis of recent studies and publications. Recent research on this perspective contains different approaches to issues of financial risk, risk tolerance and its provision in conditions of innovative development of the enterprise. Modern Ukrainian scientists V. Hlushchevskyi [1], O. Zhykhor and M. Shtekhan [2], H. Partyn, O. Burba [3] dedicate their works to the study of the nature of financial risks and their impact on ensuring the economic security of enterprises in conditions of innovative development. Problems of modern risk management at enterprises are raised in the works of M. Dyba [4], H. Kramarenko, O. Chorna [5]. Questions of formation and maintenance of risk tolerance of the enterprise are considered in works of V. Hrosul, H. Balamut [5], E. Husakovska, L. Rybalko-Rak, L. Postavna [7], O. Zakharkina [8, 9], M. Karpuntsova [10], S. Kulakova, K. Kasminina [11] and many other scientists.Among the latest foreign publications in this direction are the works of A. Rangone [12], I. Rakonjac, V. Spasojević Brkić [13], J. Wonglimpiyarat [14] and others. However, in the theory of risk management during innovative transformations at the enterprises there are many issues that require additional research in this area.

Aim of the article – analysis of tools to assess the risk tolerance of the enterprise and determine the optimal ways of its formation in conditions of innovative development.

Presentation of the main material of the study. Consideration of the formation of risk tolerance of the enterprise should begin with a review of existing approaches to defining the concept of risk and its content. At the same time, as shown by the results of a study of the frequency of search queries within the Google search engine, which is implemented using the software product Google Trends (Fig. 1), among all types of risks inherent in the enterprise, the greatest interest is caused by financial risk.

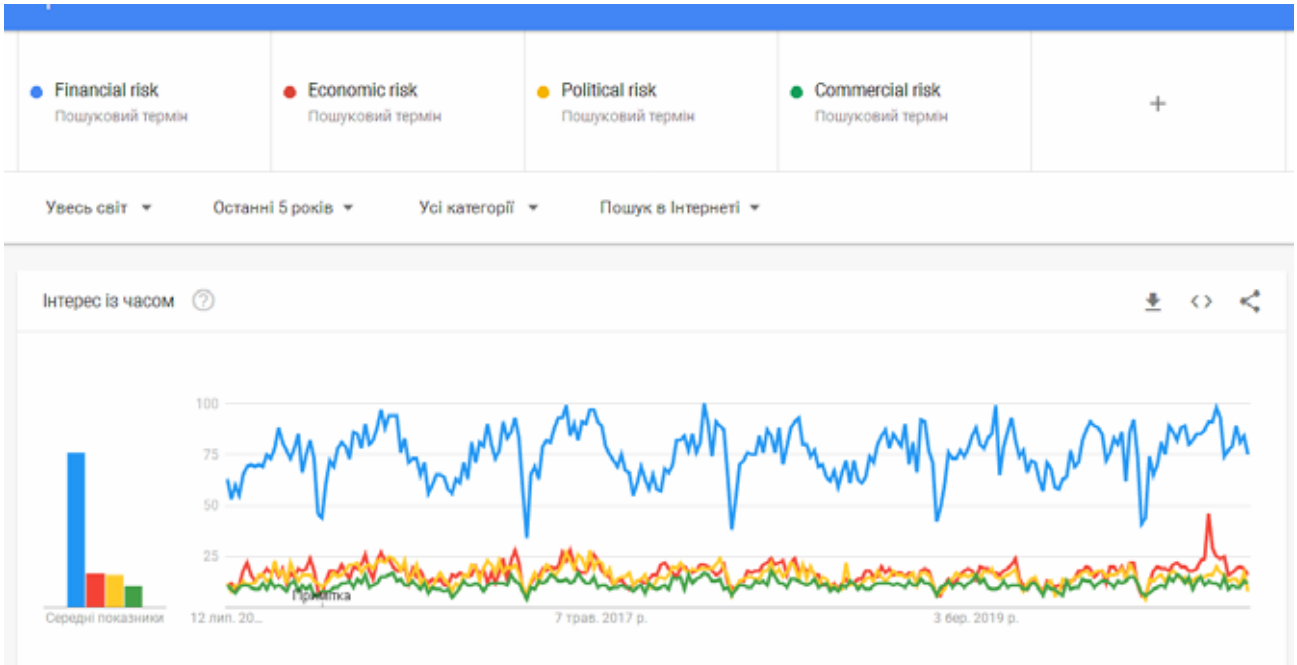

Fig. 1. The level of application of search queries for different types of risks that accompany the activities of the enterprise

O. Zhykhor and M. Shtekhan define financial risk as "a specific economic category that arises in the course of economic activity and reflects the probability of reduced profits, loss of capital, bankruptcy under the uncertainty of financial, production and economic factors" [2]. H. Kramarenko and O. Chorna note that: "…financial risks are, firstly, the danger of potentially possible, probable loss of resources or underfunding compared to the option designed for the rational use of resources in this area of activity; secondly, the probability of obtaining additional income associated with the risk" [5]. M. Dyba considers financial risk as "…type of risk that arises in the financial and economic activities of the entity, when the causal result or measures to achieve it differ from the established goals and targets, and the resulting deviations are of a cost nature" [4]. Thus, most scholars define financial risk as the possibility of losses, deviations from planned financial results. This possibility is probabilistic. Assessment and management of financial risks is an element of the risk management system, the purpose of which is to ensure the risk tolerance of the enterprise.

The very notion of risk tolerance also has many definitions and interpretations. For example, S. Kulakova and K. Kasminina define it as the ability to withstand business destabilization through sustainable processes, control, and risk management tools and methods, including a clear corporate structure and a strong brand [11]. T. Husakovska, L. Rybalko-Rak and L. Postavna interpret risk tolerance as a characteristic that reflects the impact on the target results of the organization (business process) of certain configurations of risk factors [7]. In the paper [9] risk tolerance is considered in relation to a particular business entity and characterizes the interaction of the enterprise with higher level systems, internal and external factors, its ability to maintain stability in the presence and implementation of risks. V. Hrosul and H. Balamut provide a definition of a similar concept: "risk protection" which is an internal characteristic of the system of adaptive management of sustainable development, which determines the possibility of maintaining its integrity under the influence of various environmental factors and characterizes the degree of development competencies of staff in the implementation of target goals of the enterprise and confrontation with the risk situation [6].

The connection between risk tolerance and the risks of innovation in the enterprise is deemed to be obvious. In essence, they characterize the same phenomenon, but from different points of view. Risk is an objective characteristic, a measure of uncertainty that characterizes the deviation of the result from the planned level, the probabilistic amount of losses (negative return) of the enterprise. Risk tolerance is considered in relation to a particular business entity and characterizes the interaction of the enterprise with higher-level systems, internal and external factors, its ability to maintain stability in the presence and implementation of risks [9].

Development of a risk management system to ensure risk tolerance is considered the main purpose of enterprise management. In order to achieve the goals, the company is interested only in those risks that may affect this process. The most important part of management in today's business environment is the diagnosis of possible risk losses. Identifying possible losses in the event of risks and identifying these risks, ie determining the significance of each of them for each individual enterprise for a certain period of time is known as the diagnosis of risks. Various techniques and methods are used to increase the level of risk tolerance. Among the most common are: diversification; limitation; self-insurance; insurance; hedging, etc. Simultaneously, diversification and insurance are among the most frequently used ones. Partially, this is due to the low cost required to use these mechanisms. In the conditions of objective existence of risk and as a result of financial losses, certain tools which are capable to consider risks of acceptance of these or those financial decisions are necessary. One such tool is the use of a well-known capital asset pricing model (CAPM), which involves determining the ratio of profitability and risk inherent in various financial investment instruments.

As is known, «…CAPM model characterizes the process of forming the market price of individual securities (other objects of real and financial investment) under conditions of a perfect capital market and taking into account the systematic risk that is not subject to diversification. According to it, the expected return on an asset or portfolio of assets is equal to the sum of the risk-free interest rate and premium for the risk of investing in a particular asset, defined as the product of the level of systematic risk inherent in this asset and the average market risk premium [15, 16]»:

$$r_i = r_f + (r_m - r_f)\beta_i \tag{1}$$

where r_i – expected return on the i-th asset;

r_f – return on risk-free asset;

r_m – expected market return;

βi – beta coefficient of the i-th asset, which measures the sensitivity of its profitability to fluctuations in market profitability [17, p. 164], or a measure of systemic risk (market risk).

Beta coefficient expresses the level of relative risk of investing in the asset, ie the degree of sensitivity of the particular company's securities to systemic risk. Beta coefficient demonstrates how to change the profitability of a specific asset by changing market return by 1%. Thus, the value of the coefficient for the company "X", equal to 0.3, suggests that if the profitability of the market portfolio increases by 1%, the profitability of this company will increase by 0.3% (with a decrease of 1% it will decrease by 0.3%).

In practice, the β- coefficient for individual companies (industries) is calculated by companies (Merrill Lynch, Barra, Bloomberg, S & P, Value line, etc), that specialize in asset valuation. The approach to estimating the β- coefficient of the above companies is based on a regression analysis of the return of a particular stock on the profitability of the market portfolio.

The following formula is used to determine the β-coefficient [18]:

$$\beta = \frac{Cov(r_i, r_m)}{\sigma_m^2} \tag{2}$$

where r_i – return on the i-th asset;

r_m – market return;

σ^2_m – dispersion of market return.

Thus, securities that have a high beta rate of more than one are called aggressive. This is due to the fact that their level of profitability has a higher dynamics compared to the corresponding dynamics of the level of profitability of the entire market portfolio. Low-beta securities are called conservative. This is due to the fact that their level of profitability has a lower dynamics compared to the level of profitability of the portfolio as a whole. Securities with a beta ratio equal to one are called normal or medium risk. To analyze the level of risk, the profitability of energy sector enterprises PJSC "Centerenergo" and PJSC "Donbasenergo" was analyzed, as well as the profitability of the PFTS stock index for the last 2 years with monthly profitability (Table 1).

Table 1
Profitability of enterprises and the stock market

TradeDate	PFTS Index	PFTS profitability	PJSC "Centrenergo" Course	PJSC "Centerenergo" profitability	PJSC “Donbasenergo” Course	PJSC “Donbasenergo” profitability
01.04.2018	358,46		18,95		24,87	
01.05.2018	474,77	32,45%	21,33	12,56%	30,35	22,03%
01.06.2018	451,86	-4,82%	16,69	-21,75%	31,31	3,16%
02.07.2018	463,95	2,67%	15,2	-8,93%	24	-23,35%
01.08.2018	510,71	10,08%	14,98	-1,45%	26,7	11,25%
03.09.2018	527,81	3,35%	14,63	-2,34%	25	-6,37%
01.10.2018	538,17	1,96%	15,14	3,49%	25,15	0,60%
01.11.2018	571,21	6,14%	17,37	14,73%	29,5	17,30%
03.12.2018	577,95	1,18%	17,52	0,86%	31,25	5,93%
03.01.2019	556,70	-3,68%	14,22	-18,84%	30,92	-1,06%
01.02.2019	552,98	-0,67%	14,38	1,13%	33,05	6,89%
01.03.2019	555,41	0,44%	13,45	-6,47%	34,9	5,60%
01.04.2019	562,99	1,37%	11,95	-11,15%	28	-19,77%
02.05.2019	559,40	-0,64%	12,6	5,44%	30	7,14%
03.06.2019	564,74	0,95%	12,5	-0,79%	28,8	-4,00%
01.07.2019	549,52	-2,70%	11,2	-10,40%	26,4	-8,33%
01.08.2019	540,60	-1,62%	10,71	-4,37%	23,6	-10,61%
02.09.2019	528,47	-2,24%	10,5	-1,96%	23,7	0,42%
01.10.2019	524,85	-0,68%	9,77	-6,95%	27,05	14,14%
01.11.2019	521,86	-0,57%	8,8	-9,93%	25,5	-5,73%
02.12.2019	509,82	-2,31%	8,5	-3,41%	25,3	-0,78%
03.01.2020	509,65	-0,03%	8,85	4,12%	26,2	3,56%
03.02.2020	509,25	-0,08%	9,25	4,52%	27,5	4,96%
02.03.2020	532,91	4,65%	9	-2,70%	27	-1,82%
01.04.2020	509,85	-4,33%	7	-22,22%	22,3	-17,41%
04.05.2020	500,38	-1,86%	6,3	-10,00%	19,6	-12,11%

Source: compiled by the authors on the basis of [19]

In order to calculate the β-coefficient of these enterprises, it is advisable to use graphical regression analysis using the tabular editor EXCEL. Figure 2 illustrates the results of calculating the β-coefficient for PJSC «Centerenergo», and Figure 3 for PJSC «Donbasenergo».

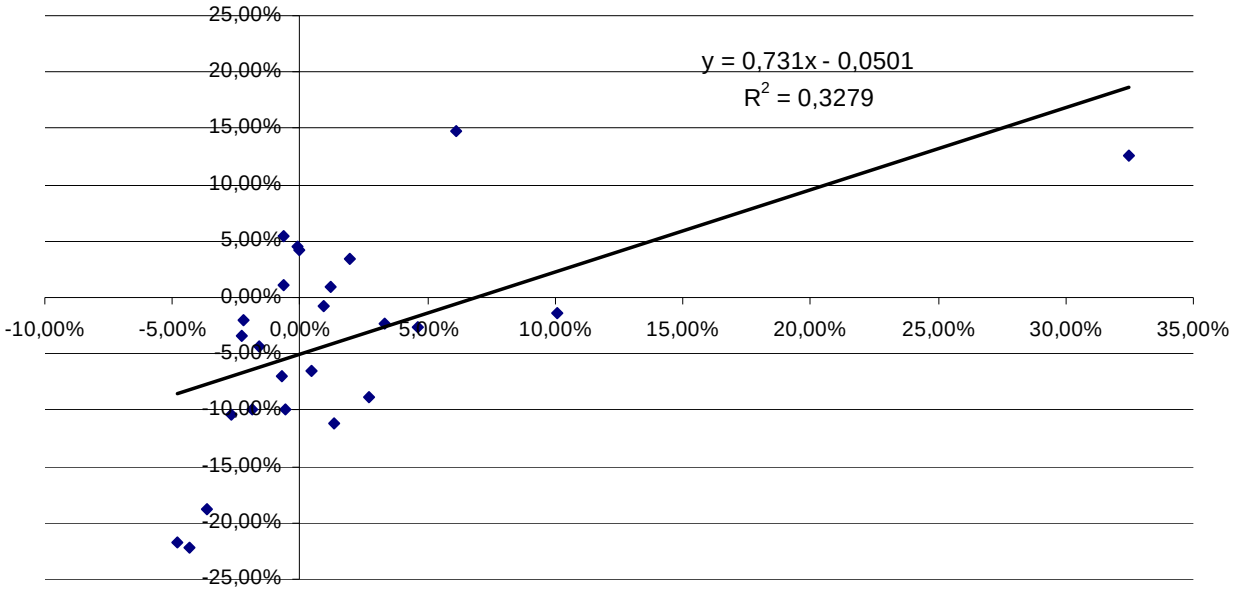

Fig. 2. Results of calculation of β-coefficient for PJSC "Centerenergo"
Source: calculated by the authors

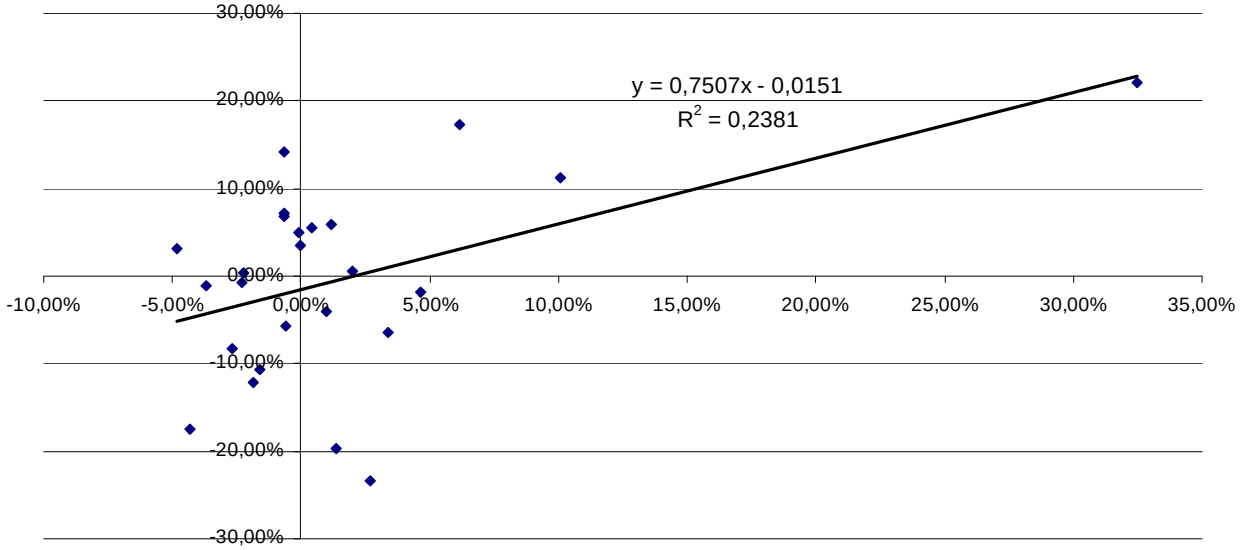

Fig. 3. Results of calculation of β-coefficient for PJSC "Donbasenergo"
Source: calculated by the authors

Calculations demonstrate that the β-coefficient for PJSC "Centerenergo" equals 0.731, and the β-coefficient for PJSC "Donbasenergo" equals 0.751. This suggests that the risks of investing in these companies are lower than the market average.

Results. The study allows us to conclude that ensuring risk tolerance in the implementation of innovative transformations is one of the main tasks of financial management of the enterprise. The synthesis of different approaches to defining the concept of risk tolerance has shown that it is the ability of the enterprise to maintain resilience in the presence and implementation of risks under the influence of internal and external factors that are inherent in innovative activity. One of the main areas of risk tolerance is the preservation of financial stability, which in conditions of innovation processes can be achieved through the use of modern models of risk diagnosis, one of which is the model of capital asset pricing model (CAPM). These examples illustrate that while focusing on the risk indicators of this model, namely the β-coefficient, the company's management receives the tools to ensure the necessary risk tolerance in the implementation of innovative projects.

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Стаття надійшла до редакції 14.07.2020 р.